

Pesticide Use on Carlisle Conservation Lands: An Evaluation of Public Notification and Reporting

Prepared by Warren Lyman
Land Stewardship Committee

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1. Introduction

Carlisle has several Town-owned conservation parcels with agricultural lands that are actively farmed by licensee farmers. The crops grown are either hay and corn (for animal feed) or cranberries (for human consumption). Both the Town as a whole, and the Conservation Commission (ConsCom), believes strongly in preserving agriculture in Town*, and ConsCom is doing its part with the agricultural land available on Town-owned conservation lands. Maintaining active agriculture in Town supports important conservation values such as preserving natural resources (fertile soils, wildlife habitat, rural vistas, groundwater recharge, etc.) as well as supporting locally-grown food production. All such agricultural activity is covered either by a detailed license or – for the cranberry bog – a long-term lease. The licenses/lease do allow pesticides to be used, but only if Best Management Practices (e.g., Integrated Pest Management) are employed with State- and Federally-approved chemicals. State and Federal rules on pesticide applications must be followed. The Conservation Commission actively reviews the farmer’s activities, at least on an annual basis, and it reviews the major components of its required agricultural practices as needed. One area that had not recently been evaluated was that of public notification and reporting of pesticide applications. Concerns on this

* At a Special Town Meeting on September 19, 1994, the Town voted a resolution “...to support, encourage and promote agriculture in Carlisle. Farming is an appropriate use for town lands and can be consistent with conservation goals and objectives.” This theme is reiterated in all of the Open Space and Recreation Plans the Town has prepared.

topic led the Land Stewardship Committee (a subcommittee of the Conservation Commission) to undertake a review of the matter starting in late 2006. This report is a result of that review.

This report provides information of the pesticides used on Town-owned conservation lands, the potential human health and environmental hazards of the pesticides, and the current status of public notification and reporting related to the pesticide use. Federal, State and local rules regarding pesticide use notifications are summarized. Recommendations are made for improving public notification and reporting with the goal of reducing potential harm to the public using the conservation lands, to their dogs and horses, and to the environment.

2. Purpose of Evaluation

In October 2006, the Land Stewardship Committee passed a Motion to:

“...form a working study sub-group to examine the current Carlisle lease and license agreement conditions regarding the use of pesticides on Town-owned conservation lands in Carlisle. Part of this examination process will include: 1) learning what chemicals are currently used on Town-owned conservation lands; 2) researching the management policies of other towns and conservation groups; and 3) evaluating the adequacy of current reporting and public notification requirements and practices.” (Motion approved at LSC meeting on October 17, 2006.)

The primary purpose of this report is to address all three issues listed in the Motion above and – most specifically - to evaluate the adequacy of current reporting and public notification requirements and practices pertaining to the agricultural use of pesticides on Town-owned conservation lands. The focus is on the Cranberry Bog as that is where the largest number of pesticides is used in conjunction with the growing of cranberries. In recent years, thirteen different pesticides (herbicides, insecticides and fungicides) have been reported by Carlisle Cranberries, Inc., as having been used at the Bog (**Table 1**). Not all pesticides are used every year. The chemicals used and the application rates are based on Integrated Pest Management* methods.

In addition to the above, various herbicides have occasionally been used on other conservation lands where corn has been grown including Foss Farm, Hutchins, and Greenough. The herbicides have included Aatrex, Atrazine, Bullet, Micro-Tech, Partner, Prowl, Python and Roundup. EPA registration numbers for the specific formulations used are not required to be reported by the farmer. Without the registration numbers, it is difficult to double check the identity of the chemical, and to identify the specific formulation used. This, in turn, restricts the ability to conduct a hazard assessment.

* Integrated Pest Management (IPM) is a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health and environmental risks. (Definition by National IPM Network).

Table 1. List of Pesticides Used by Carlisle Cranberries, Inc.: 2001 – 2006

Trade Name	EPA Registration Number	Purpose	Method of Application*
Bravo	50534-188-100	Fungicide	Chemigation
Devrinol 10G	10182-253-70506	Herbicide	Ground
Devrinol 50-DF	70506-36	Herbicide	Chemigation
Diazinon AG 500	34704-231	Insecticide	Chemigation
Ferbam	45728-7	Fungicide	Chemigation
Guthion	264-733	Insecticide	Chemigation
Kerb 50-W	707-159	Herbicide	Chemigation
Lorsban 4E	62719-220	Insecticide	Chemigation
Poast	7969-58-51036	Herbicide	Spot spray
Roundup	524-537	Herbicide	Wipe
Roundup Ultra	524-475	Herbicide	Wipe
Sevin	264--330	Insecticide	Chemigation
Sevin XLR Plus	264-333	Insecticide	Chemigation

* Chemigation is the process of applying an agricultural chemical (fertilizer or pesticide) to the soil or plant surface with an irrigation system by injecting the chemical into the irrigation water. "Wipe" means that the pesticide is wiped onto the target plant with an impregnated sorbent material (e.g., a sponge on the end of a stick).

In order to evaluate the adequacy of reporting and notification requirements, it was necessary to review the hazards known to be associated with the pesticides used. In addition, it was necessary to review Federal, State and local reporting and notification requirements. A secondary purpose of the study was to see if there were other issues related to pesticide impacts on the environment that should be better understood by the Conservation Commission and the Town.

The issue of notification (for pesticide applications) would be much less important if there was always strict segregation of the crop areas treated with pesticides and the non-crop areas used by humans and wildlife. However, it is not all that uncommon for this segregation to break down. Examples include:

- Pesticides applied through the air (including spray irrigation*) can reach non-crop areas by drift or as a result of improperly aimed (or screened) sprayer heads. These non-crop areas include perimeter walkways used by the public and – for the Bog - adjacent water bodies.
- Humans, but more often their dogs, sometimes enter the treated crop areas unaware of the potential hazards.

* When pesticides are added to a spray irrigation system, the process is commonly called chemigation.

A major goal of this report is to present recommendations for ways to improve, if not strictly enforce, the above-described segregation.

Carlisle has had a long history – over 30 years – of working with farmers growing crops on Town-owned conservation land. The issues of fertilization, erosion control and pesticide use have all been publicly discussed on several occasions. It is hoped that another discussion will provide improvements in the notification and reporting of pesticide applications to the public using the lands for recreation.

3. Information Sources

Hazard Information

Hazard information for each pesticide in Table 1 was obtained from the official label the US Environmental Protection Agency (EPA) requires each pesticide to have. These labels were obtained on the Web, most commonly from the manufacturer's Web sites. Each label is required to have sections entitled "Hazards to Humans and Domestic Animals" and "Environmental Hazards." These sections, which contain qualitative information only (i.e., no quantitative toxicological data), are reproduced verbatim in **Appendix A** of this report. No separate literature review or toxicological evaluation was conducted for the pesticides under consideration.

Federal, State and Local Requirements

Federal notification requirements, issued by the EPA, are listed in the Code of Federal Regulations (40 CFR 170: Worker Protection Standard)¹. A guidance document is also available.² It is important to note that the EPA regulations apply almost exclusively to agricultural workers. Some issues were clarified in a phone call with EPA's Region 1 (New England) Pesticides/Agriculture Manager and Regional Coordinator for Worker Protection Standards.³

State notification requirements, issued by the Massachusetts Department of Agricultural Resources (DAR) – Pesticide Bureau, are listed in the Code of Massachusetts Regulations (333 CMR)⁴, and were developed under authority of Statute 132B: Massachusetts Pesticide Control Act.⁵ It is important to note that the notification requirements only apply to so-called "restricted use" and "state limited use" pesticides, which are a small subset of all state-registered pesticides. Some issues were clarified in a phone call with the Manager of DAR's Division of Regulatory Services.⁶

Local (Carlisle) requirements for notification for all properties except the Bog are contained in a document entitled "Exhibit A – Required Agricultural Practices" which is made a part of every Agricultural License Agreement. For the Bog, the requirements are contained in the Town's lease of the Bog's agricultural areas to Carlisle Cranberries, Inc. (signed June 13, 1995). Key sections of the lease include Section 10 (Insect, Weed, Disease and Pest Management), 13 (Liaison), and 15 (Notices). A copy of the lease is

included in the Cranberry Bog Baseline Assessment prepared by the Land Stewardship Committee. Some further details are provided in Section 4 below.

Other Massachusetts Towns with Similar Situations

Four other Massachusetts towns were identified that have operating cranberry bogs on conservation lands owned by the town or a local land trust. The towns are Nantucket, Marion, East Rochester and Falmouth. An individual knowledgeable about each bog was contacted to see if they had specific policies regarding public access and notification for bogs where pesticides were being applied.

Pesticide Use Data

Data on pesticide usage on Town-owned conservation lands was obtained from the farmer's reports which are on file in the Conservation Commission office in Town Hall. Some information on pesticide application methods and notifications was obtained as a personal communication from Mark Duffy, President of Carlisle Cranberries, Inc.

4. Findings

Introduction

Table 2 provides summary information on the pesticides used at the Cranberry Bog between 2001 and 2006. Specifically included is information on the active ingredients, EPA requirements for worker notification (and associated restricted entry intervals), and qualitative assessments of the toxicity to humans and other biota. Note (see columns 2 and 3 of Table 2) that, due to the unavailability of some information on the Web, the information provided is not always for the pesticide with the exact same formulation (and EPA registration number) as was reported by Carlisle Cranberries, Inc. However, the active ingredients are the same; thus the information provided should be pertinent for the pesticides used at the Bog. Additional information on EPA's worker notification requirements and associated restricted entry intervals is provided below.

The four right-hand columns of Table 2 present simple, one-word descriptions of the relative toxicity of each pesticide to humans, aquatic biota, wildlife and bees. The words listed for each chemical, except for "high" and "yes", were taken verbatim from the pesticide's label. The "high" designation for humans implies that death is possible from ingestion or overexposure. The "yes" designation is also not a direct quote, but a general representation, based on statements in Appendix A, that there is some toxicity expressed for at least one exposure route (e.g., ingestion, inhalation, or skin contact). It is presumed (by the author of this report) that a "yes" designation implies the toxic level is NOT "high" or "extreme." A blank indicates no information was available. See Appendix A for verbatim copies – from the pesticides' labels - of the descriptions of "Hazards to Humans and Domestic Animals" and "Environmental Hazards."

Table 2. Information on Pesticides Used at the Cranberry Bog in Carlisle

Product	EPA Reg. No.	Same Reg. No. as CCI ⁷	Active Ingredients	As sold: % Active Ingredients	Worker Notification Required ¹	Restricted Entry Interval ²	Toxic to: ⁵			
							Humans	Aquatic Biota	Wildlife	Bees
Devrinol 10-G	50534-188-100	yes	Chlorothalonil ⁸	54	Single	12 hrs ³	Yes	Yes	Yes	
Devrinol 50-DF	70506-34	no	Napropamide	10	Single	12 hrs	Yes	Yes		
Diazinon AG 500	70506-38	no	Napropamide	50	Single	12 hrs	Yes	Yes		
Ferbam Granuflo	829-262	no	Diazinon	47.5	Single	24 hrs	Yes	Highly	Highly	Highly
Guthion Solupak	45728-7	yes	Ferbam	76	Single	24 hrs	Yes	Yes	Yes	
Kerb 50-W	264-733	yes	Azinphos-methyl	50	Double ⁴	7 - 15 days ⁵	High	Extremely	Extremely	Highly
Lorsban-4E	62719-397	no	Pronamide	50	Single	24 hrs	Yes	Yes		
Poast	62719-220	yes	Chlorpyrifos	44.9	Single	24 hrs	High	Extremely	Yes	Highly
Roundup Original	7969-58-51036	yes	Sethoxydim	18	Single	12 hrs	Yes	Yes		
Roundup Ultra Max II	524-445	no	Glyphosate	41	Single	12 hrs	Yes	Yes		
Sevin brand 4F	524-537	yes	Glyphosate	48.8	Single	4 hrs	Yes	Yes		
Sevin XLR Plus	264-349	no	Carbaryl	43	Single	12 hrs	High	Extremely		Highly
	264-333	yes	Carbaryl	44.1	Single	12 hrs	High	Extremely		Highly

Note: Federal regulations on worker notification and restricted entry interval (table columns 6 and 7) are contained in 40 CFR 170.

1. Single: The agricultural employer must give notice of the pesticide application to agricultural workers either by the posting of warning signs or orally.
2. Restricted-entry interval (REI) is the time after the end of a pesticide application during which entry into the treated area by agricultural workers is restricted.
3. Special eye protection required for any entry in next 6.5 days.
4. Azinphos-methy is a double notification chemical. Workers must be notified of the application by warning them orally and by posting warning signs at entrances to treated areas.
5. Restricted Entry Interval (REI) range is for various fruits. No REI is specifically given for cranberries.
6. Information on toxicity taken from qualitative statements on pesticide lable. "Yes" for humans is implicit from statements given. "High" for humans implies possible death from ingestion or overexposire. Lack of statement does not imply lack of any toxicity; just no information on label.
7. CCI = Carlisle Cranberries, Inc. "No" means registration number listed in this table (associated with information given) is not the same as for the pesticide used by Carlisle Cranberries, Inc. However, the active ingredients is the same, so the information provided should be pertinent.
8. Chlorothalonil is a (Massachusetts) State restricted use chemical. However, the signal word on the label of the formulation used is "caution" and not "danger" which would trigger certain notification requirements for applications. See text for further information.

Frequency and Timing of Pesticide Applications

Table 3 provides information of the frequency and timing of pesticide applications at the Cranberry Bog between 2000 and 2006. As shown, between three and nine different pesticides have been applied in any one year, and between four and eleven different application dates have been required. All chemigation applications have been reported as being on a single date, while most wipe or spot applications have been spread over one to three months. Most chemigation applications are carried out at night. Seasonally, pesticide applications at the Bog start as early as late April and extend to late August or early September.

Pesticide applications on other conservation lands are much less frequent, often requiring just one to three pesticides and application dates.

Table 3. Frequency and Timing of Pesticide Applications at the Cranberry Bog

Year	No. of Pesticides Used	No. of Application Dates ¹	Date of:	
			Earliest Application	Latest Application
2006	5	6 ²	27-Apr	1-Sep
2005	5	7 ³	27-Jun	25-Aug
2004	6	8 ²	21-May	5-Sep
2003	5	6 ²	17-Jun	2-Sep
2002	9	11 ²	29-Apr	1-Aug
2001	3	4	7-Jul	6-Aug
2000	9	10 ⁴	28-Apr	22-Aug

1. Unless otherwise specified, all applications (for each pesticide) were on a single date. Pesticides may have more than one application/yr.
2. One Roundup application (via wiping) was spread over two months.
3. One Roundup application (via wiping) was spread over two months, and one Poast application (spot spraying) was spread over one month.
4. One Roundup application (via wiping) was spread over three months, and one Stinger application (via wiping) was spread over one month.

Federal Notification Requirements

The notification requirements set by the EPA (40 CFR 170: Worker Protection Standards) technically only apply to agricultural workers. For “farms and forests,” there is, however, the general requirement (40 CFR 170.110) that:

“During the application of any pesticide on a farm or in a forest, the agricultural employer shall not allow or direct any person, other than an appropriately trained and equipped handler, to enter or to remain in the treated area.”

EPA's notification requirements cover two groups of pesticides: single notification and double notification. As described more fully below, a single notification pesticide requires worker notification either by posted signs or orally. A double notification pesticide requires both the posting of signs and oral notification. It is necessary to check the pesticide's label to determine which group it belongs to. Amongst the pesticides use at the Bog, only one (Guthion Solupak) is a double notification pesticide.

For most (if not all) pesticides, EPA requires adherence to a "restricted entry interval" which is the period of time, following pesticide application, that agricultural workers must wait before reentering treated areas (without specialized protective clothing). As seen in Table 2, these intervals range from 4 hours to 15 days for pesticides used at the Bog. Most are either 12 or 24 hours.

When so-called "single notification" pesticides are applied (see Table 2), EPA requires (40 CFR 170.120) that agricultural workers be notified either by the posting of warning signs or orally. When posting is used, a specific sign must be used (**Figure 1**). Specifications are provided for the size (at least 14" x 16" with letters 1" high), number, location and language of such signs, and for the timing of their placement (< 24 hours before application) and removal (generally within 3 days after application and any restricted entry interval). When agricultural workers are present, and pesticides have been applied in the last 30 days, additional information on the pesticides, and related health and safety information, must be posted for the workers. However, this information does not have to be posted at the treated agricultural areas; it must only be in a place where it can be readily seen and read by workers.



Figure 1. Warning Sign Required by 40 CFR 170.120

Because signs like that shown in Figure 1 have not been posted at the Bog, it is assumed that agricultural workers are being given oral notification for single-notification pesticides.

State Notification Requirements

Section 13 of the Massachusetts pesticide regulations (333 CMR) imposes notification requirements for pesticide applications for so-called “restricted use” or “state limited use” pesticides (as classified in 333 CMR 8.05(3)) if the pesticide label bears the Signal word* “Danger” and the application is within 50 feet of a public way. Because the one restricted use pesticide used at the Bog (Chlorothalonil) does not have “Danger” as the Signal word on its label, and because no state limited use pesticides are used, the State’s notification requirements do not apply to the current usage of pesticides at the Bog. When notification is required, signs like the one shown in Figure 1 must be used.

Town of Carlisle Notification and Reporting Requirements

Cranberry Bog

On June 13, 1995, the Town of Carlisle signed a lease with Carlisle Cranberries, Inc. that allows the latter to operate the Cranberry Bog for 20 years. Two sections of the lease speak to notification requirements for past or planned pesticide applications:

Section 10 (E): “The Lessee shall provide and maintain either (a) a telephone answering service or (b) a permanent bulletin board at an entrance to the Agricultural Area, on either of which information is updated weekly, stating what chemicals have been applied during the previous seven (7) days and what chemicals the Lessee anticipates applying during the next seven (7) days.”

Section 13 (C): “The Lessee shall provide annually by December 31, a list of any pesticides, herbicides and fertilizers applied during the previous 12 month period, including the name of the substance, the date it was applied, the amount used, and the method used to apply it.”

Generally, the requirements of Section 10(E) and 13(C) have been met. Regarding the requirements of Section 10(E), Carlisle Cranberries, Inc., has made it a practice to post a notice of each pesticide application on the permanent bulletin board that exists at the Cranberry Bog (see **Figure 2**). The notice is usually posted at the time of application and is only removed at the time of the next pesticide application. Because of the poor placement of the bulletin board**, such posting has not been of any significant value to the public which is likely unaware of the posting practice. Generally notices are not posted that list anticipated pesticide applications in the next 7 days. This is primarily due to the fact that the farmer himself generally has limited advance notice of when an application is necessary. This is associated with the use of Integrated Pest Management (IPM) and an IPM ‘scout’ who regularly checks the bogs and reports to the farmer when an application appears necessary. Using IPM methods, pesticide applications are not

* Signal words on pesticide labels (and their meanings) are commonly either: “Caution” (slightly toxic), “Warning” (moderately toxic) or “Danger” (highly toxic).

** The bulletin board is approximately 100 feet behind the Bog House and faces away from normal pedestrian travel paths.

scheduled in advance; they are only used when and if needed.



Figure 2. Bulletin Board at the Cranberry Bog

At the end of each season, Carlisle Cranberries, Inc. submits a report on pesticide applications to the Town using both the Carlisle Agricultural Land Use Report Form (see **Appendix B**) and the State's PAPPAS Pesticide Reporting Form (see **Appendix C**). Only the latter form requires the submittal of details on each application such as the pesticide's EPA registration number, date and time of application, acres treated, treatment rate, method of application, and pre-harvest interval.

Other Conservation Lands

When other conservation lands in Carlisle are used by a farmer, a standardized *Agricultural License Agreement* is used. Section 7(f) of this Agreement requires the licensee to "...use its reasonable best efforts to comply with the agricultural practices and procedures set forth on Exhibit A, attached hereto." Exhibit A contains twelve requirements, four of which relate to pesticide use. Two requirements (#s 3 and 9) relate to the issue of notification:

"3. The Conservation Commission (ConsCom) will be informed one week before the Tenant intends to use any pesticides or herbicides. In the event that circumstances preclude such notification, the Conservation Administrator or ConsCom Chairperson shall be informed of the applications a minimum of twenty-four (24) hours prior to the application of any materials."

"9. A written report of land use during the past growing season shall be filed by the Tenant on or before December 1st. At that time, a land use planning form will be filled out by the ConsCom in concert with the Tenant detailing plans for crop, fertilizer and pesticide usage for the upcoming growing season."

Note that none of the above requires notification of the public using the lands in question. At the end of each season, the farmer is required to submit a completed Carlisle Agricultural Land Use Report Form (Appendix B). Regarding pesticide applications, the

Form only requires a listing of the pesticides used and the intended target. The EPA registration number is not required, nor is the date(s) or method of application.

Current Notification Signs at the Bog

While there are a number of informational signs at the Bog for the public, only two small signs (12" x 12") contain any warning about the use of pesticides on the agricultural lands there. One sign (see **Figure 3**) is located just to the north of the Bog House on an entrance pathway that is used by very few visitors. The second is near the parking lot on the other side of the Bog House; it contains the same text as shown in Figure 3.



Figure 3. Sign at Entrance to Cranberry Bog on North Side of Barn

Activities in other Massachusetts Towns with Cranberry Bogs on Conservation Lands

*Nantucket*⁷ – The Nantucket Conservation Foundation (NCF) actually owns two cranberry bogs that are generally open to the public for hiking and biking on the many trails that surround and bisect the bogs. The smaller one, Windswept (~35 ac), which has been allowed to revert to an organic bog, may be taken out of production. Weeds are a major problem in that bog. The larger bog (~200 ac) is actively farmed by NCF staff, and liability (related to potential public exposure to pesticides) is considered to be a significant issue. When pesticides are applied, warning signs are put at entrance locations and the trails are often closed. The signage and closure conditions are maintained for a few days to a week. The groundwater is tested every month for pesticides.

*Marion*⁸ – Marion has an operating cranberry bog on Town-owned conservation land. Other lands with inactive bogs have also been acquired. The Sippican Lands Trust (operating only in Marion) has played a part in some of the acquisitions. The original owner of the currently-operating bog has apparently retained the rights to grow cranberries for 3 – 5 more years. This bog does have trails around it, but the Town contact was unaware of any requirements for (or use of) signage regarding pesticide use or other precautions to protect the public.

*Falmouth*⁹ – The Town-owned cranberry bog is about 60-70 acres and runs along both sides of the Coonamessett River. Cranberry growing is licensed to a local farmer. Chemical usage at the bog has been a major public issue because the concerns of citizens (many with dogs) who walk around the bogs. Before issuance of the current license, the Town tried to find an organic farmer for the bog but was unable to do so. The current license did, however, ask the licensed farmer to try to move towards more organic methods. The Town has tried to inform the public of pesticide use at the bog using a combination of: (1) large, permanent signs; and (2) temporary signs that are put up just before pesticide application and removed after a specified interval. There have been problems with the latter, especially with the temporary signs not being removed in a timely manner. The Town recently charged the farmer with breach of contract, and the farmer has counter-sued.¹⁰

*Rochester*¹¹ – In 2006, the town of Rochester and The Trustees of Reservations (TTOR) joined to protect a major portion of a 775-acre farm. The protected part, now called East Over Reservation, is about 375 acres. The cranberry bogs which were a part of the farm remain in private ownership, but there will be trails around them that the public will be allowed to use. The farmer has told the buyers he will likely close the trails temporarily after pesticide applications. Dogs will have to be on leashes.

5. Conclusions and Recommendations

Conclusions

A variety of pesticides are being used by farmers who have licenses or leases for agricultural use of portions of Town-owned conservation lands. Thirteen different pesticides (including insecticides, herbicides and fungicides) have been used in recent years (2001 – 2006) at the Cranberry Bog, and eight different herbicides have been used on other conservation lands (where corn is grown) including Foss Farm, Greenough and Hutchins. In total, there are usually between six and twelve application dates per year (excluding spot or wipe applications at the Bog). All of the pesticides have some degree of toxicity to humans and domestic animals. For some the toxicity is considered high. All the pesticides used at the Bog have some degree of toxicity to aquatic biota; for some aquatic biota, the pesticides are “highly” or “extremely” toxic. Several of the pesticides used at the Bog are also toxic to wildlife and bees. Again, the terms “highly” and “extremely” toxic are associated with a few of the pesticides.

There is inadequate awareness by the public of the pesticides used, the manner and timing of use, and the potential hazards to humans, domestic animals (especially dogs and horses), and aquatic and terrestrial wildlife. Stronger means need to be employed to inform conservation land visitors of the use of pesticides on lands they are walking next to, and their responsibilities to keep themselves and their dogs out of the crop areas, even when pesticides are not being used. This notification requirement is primarily a responsibility of the Town except to the extent it transfers some responsibility in the Agricultural License Agreements signed with each farmer.

There is also a special burden for farmers applying pesticides on Town-owned conservation lands to take measures necessary to insure that no pesticides are inadvertently allowed to drift onto, or be sprayed onto, walkways used by the public.

Federal and State notification requirements regarding pesticide applications generally make the (unstated) assumption that private land is involved. The focus is on notification for the benefit of agricultural workers. There are no significant rules regarding notification of the public when pesticide applications are on lands open to the public. There is, in fact, no specific consideration that exposed populations might include the general public, children, and pets. Thus, the Federal and State statutes do not provide a sufficient (or suitable) basis for informing the public who visit conservation lands being treated with pesticides.

Carlisle's notification requirements for the Cranberry Bog are generally being met. The requirement for advance notification (generally not met) is difficult because of the short notification the farmer has himself when using IPM techniques. Ongoing notification of recent applications is provided, but only on a single bulletin board seen by few of the visiting public. Carlisle's notification requirements for other properties – which only require advance notification to ConsCom - are apparently not being met. However, this assessment does not take into consideration any historic verbal agreements on modified procedures that may have been (as has been suggested) agreed to by past Conservation Commissions. The required end-of-season reports by each farmer do not supply enough information in some cases. While the report forms for the Bog (Appendices B & C combined) are generally adequate, the form for other properties (Appendix C) commonly does not require an EPA registration number (important to determine the exact formulation used), nor the application date(s) and rate(s).

Recommendations

The Conservation Commission (ConsCom) and the Land Stewardship Committee (LSC) should work to devise better methods to insure that pesticide applications on conservation lands - by Town-licensed farmers – are protective of human health and the environment. Carlisle's Town-licensed farmers should be invited to participate in the process. The focus should be on improving public notification and reporting regarding pesticide applications. The Town should not look to Federal and State regulations for guidance, nor can the Town learn much from other Massachusetts towns with pesticide-treated cranberry bogs on conservation lands. After determining the protective methods to be

used, they should be incorporated in ConsCom’s *Agricultural License Agreement*, specifically its attachment, Exhibit A, entitled “Required Agricultural Practices and Special Restrictions.” In devising new rules, ConsCom and LSC must remember that Massachusetts has a Preemption Policy that limits what municipalities can do in regulating pesticide use – primarily on private land - beyond requirements set by State and Federal regulations. These limitations may not restrict what controls can be mandated for Town-owned land.

In addition to requiring more protective methods, ConsCom and the LSC need to strengthen their oversight monitoring of pesticide notification and reporting activities.

One outcome of this process must result in improved notification of the public regarding pesticide use on the Town’s conservation lands. This could include some combination of on-site signage, news media articles, and Town publications. For signs, the main options include permanent, seasonal, and temporary signs, alone or in combination. The pros and cons of each are listed in **Table 4**.

Table 4. Some Basic Options for Pesticide Notice Signs

Sign Type	Sign Timing	Pros	Cons
Permanent	Permanent	Least effort and cost	Easily ignored by public. Least specific warning
Seasonal	April – September	More effort, but not burdensome	May be ignored after April. Not specific on dates
Temporary	24 hrs before application* to 2-3 days after application	Hardest to ignore by public. Most specific warnings	Most effort and cost

* Smaller interval may be required when IPM techniques give a shorter notice to farmer.

In all cases, signs should probably be placed either: (1) at all public entrances to the agricultural portion of the conservation land; or (2) at the periphery of the agricultural area. If the existing bulletin board is to be used to provide information on specific pesticide applications, it should be relocated to a more visible location. In addition, the public should be informed – e.g., via the news media – of the purpose of the postings on the bulletin board.

If it is determined that strict segregation of pesticide-treated areas and public walkways is not always possible, then ConsCom and LSC – or the farmer - should consider temporary closure of the affected walkways.

For protection of both humans (on walkways adjacent to treated areas) and aquatic biota at the Cranberry Bog, Carlisle Cranberries, Inc. should be required to check, at least annually, the area covered by each spray nozzle to eliminate any spray reaching walkways, and also eliminate – to the extent possible – any spray reaching adjacent water

bodies. For other conservation lands, the licensed farmer should insure that application methods used insure that no pesticides are allowed to fall onto adjacent public walkways.

Carlisle's end-of-year reporting form used by licensed farmers should be revised to require that, when pesticides are used, the following are reported: (1) pesticide name; (2) EPA registration number; (3) application date(s); (4) application rate(s); (5) application method(s); and (6) area (or acres) treated. ConsCom and the LSC should designate one or more of their members to carefully review this information annually.

For each pesticide used by a licensed farmer, the Conservation Administrator should maintain a file that contains at least the official pesticide label and a Material Data Safety Sheet.

ConsCom should retain the requirements for licensed farmers to report the pesticides likely to be used - in the next crop season - on ConsCom's "Agricultural Land Use Planning Form."

The recommendations made above must be considered tentative. Final recommendations should come from an agreement amongst the stakeholders which include ConsCom, the LSC, the licensed farmers and the public.

6. References

1. Code of Federal Regulations: 40 CFR 170 - Worker Protection Standard.
2. EPA, 2005. "The Worker Protection Standard for Agricultural Pesticides – How to Comply: What Employers Need to Know," Report No. EPA 735-B-05-002, US Environmental Protection Agency, Washington, DC. (Available at www.epa.gov/agriculture/htc.html).
3. Personal phone call with Andrea Szylvian (Tel. 617-918-1198), US Environmental Protection Agency, Region 1 (Boston, MA), on Jan. 3, 2007.
4. 333 CMR: http://www.mass.gov/agr/legal/regs/pesticide_regulations_list.htm
5. MA Statute 132B: http://www.mass.gov/agr/legal/statutes/pesticides/132b_pesticideslaw.htm.
6. Personal phone call with Brad Mitchell (Tel. 617-626-1771), Mass. Dept. of Agriculture, Jan. 8, 2007.
7. Personal communication from Tom Lennon, Nantucket Conservation Foundation, Nantucket, MA, Sept. 13, 2006. (Tel. 508-228-2884; tlennon@nantucketconservation.org).

8. Personal communication from Norman Hills, Chair of the Marion Conservation Commission (MCC), Marion, MA, Jan. 4, 2007. (MCC Tel. 508-748-3560; NAHills@comcast.net).
9. Personal communication from Mark Kasprzyk, Conservation Commission Agent, Town of Falmouth, MA, October 10, 2006. (Tel. 508-495-7445; MarkK@cape.com).
10. *Boston Globe*, December 28, 2006.
11. Personal communication from Steve Sloan, Southeast Regional Director, The Trustees of Reservations, December 8, 2006. (Tel. 781-784-0567, x-7010; SSloan@ttor.org).

Appendix A

Pesticide Label Descriptions of Hazards to Humans, Domestic Animals, and the Environment

Bravo Weather Stick (EPA # 50534-188-100) – Fungicide

Hazards to Humans and Domestic Animals

Harmful if swallowed, absorbed through skin, or inhaled. Causes moderate eye irritation. Avoid contact with skin, eyes or clothing. Avoid breathing spray mist. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.

Environmental Hazards

This product is toxic to aquatic invertebrates and wildlife. DO NOT apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Drift and runoff may be hazardous to aquatic organisms in neighboring areas. DO NOT contaminate water when disposing of equipment wash water or rinsate. This chemical is known to leach through soil into groundwater under certain conditions as a result of label use. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

The chemical can contaminate surface water through spray drift. Under some conditions, it may also have a high potential for runoff into surface water for several days to weeks after application. These include poorly draining or wet soils with readily visible slopes towards adjacent surface waters, frequently flooded areas, areas over-laying extremely shallow ground water, areas with infield canals or ditches that drain to surface water, areas not separated from adjacent surface waters with vegetated filter strips, and areas over-laying tile drainage systems that drain to surface waters.

Devrinol 10-G (EPA # 70506-34) – Herbicide

Hazards to Humans and Domestic Animals

Harmful if swallowed. Avoid contact with eyes, skin and clothing. Avoid inhalation of dust.

Environmental Hazards

Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

Devrinol 50-DF (EPA # 70506-38) – Herbicide

Hazards to Humans and Domestic Animals

May be harmful if swallowed. Causes moderate eye injury. Do not breathe spray mist. Avoid contact with skin, eyes, and clothing.

Environmental Hazards

Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment wash waters or rinsate.

Diazinon AG 500 (EPA # 829-262) – Insecticide

Hazards to Humans and Domestic Animals

Harmful if swallowed, inhaled or absorbed through the skin. Causes moderate eye injury. Avoid contact with skin, eyes, or clothing. Avoid breathing vapor or spray mist. Avoid contamination of food and feed. Food utensils such as table spoons and measuring cups should not be used for food purposes after use in measuring pesticides. Keep out of reach of domestic animals. Do not use on humans, household pets or livestock. Do not contaminate ornamental fish ponds.

Environmental Hazards

This product is highly toxic to birds, fish and other wildlife. Birds, especially waterfowl, feeding or drinking on treated areas may be killed. Because of the migratory habits of Atlantic Coast waterfowl, do not apply this product to lawns in Nassau County, New York between November 1 and May 20. Do not exceed maximum permitted label rates. Rates above those recommended significantly increase potential hazards to birds, especially waterfowl. Avoid overlapping sprays. On lawns, if waterfowl, i.e., ducks or geese, can be expected in the treated area after treatment (except spot treatment), apply at least ¼ inch of water immediately after spraying this product; however, stop watering before puddling occurs. Keep out of lakes stream, ponds, tidal marshes and estuaries. Do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Drift and runoff may be hazardous to aquatic organisms in neighboring areas. Shrimp and crab may be killed at application rates recommended on this label. Do not apply where fish, shrimp, crab, and other aquatic life are important resources. Do not contaminate water by cleaning of equipment or disposal of equipment washwaters.

This pesticide is highly toxic to bees exposed to direct treatment or to residues remaining on blooming crops or weeds. Do not apply this pesticide or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

Ferbam (EPA # 45728-7) – Fungicide

Hazards to Humans and Domestic Animals

Harmful if inhaled or absorbed through the skin. Do not breathe vapors or spray mist. Avoid contact with eyes, skin or clothing.

The consumption of alcoholic beverages increases the toxic effects of Ferbam.

Environmental Hazards

This product is toxic to fish. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters. Do not apply where runoff is likely to occur. Do not apply when weather conditions favor drift from areas treated. Apply this product only as specified on the label.

Do not allow this material to drift onto neighboring crops or non-crop areas or use in a manner or at a time other than in accordance with label directions because animal, plant or crop injury, illegal residues or other undesirable results may occur.

Guthion Solupak (EPA # 264-733) – Insecticide

Hazards to Humans and Domestic Animals

Fatal if swallowed. May be fatal if inhaled. Harmful if absorbed through skin. Causes moderate eye irritation. Do not breathe dust or spray mist. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking or using tobacco. Remove contaminated clothing and wash clothing before reuse.

Environmental Hazards

This pesticide is extremely toxic to fish and wildlife. For terrestrial uses, do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwater or rinsate. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas.

This product is highly toxic to bees exposed to direct treatment or residues on crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area. Protective information may be obtained from your Cooperative Agricultural Extension Service.

This chemical can contaminate surface water through spray applications. Under some conditions, it may also have a high potential for runoff into surface water after

application. These include poorly draining or wet soils with readily visible slopes towards adjacent surface waters, frequently flooded areas, areas overlapping extremely shallow ground water, areas with in-field canals or ditches that drain to surface water, areas not separated from adjacent surface waters with vegetated filter strips, and areas over-laying tile drainage systems that drain to surface water.

Kerb 50-W (EPA # 62719-397) - Herbicide

Hazards to Humans and Domestic Animals

Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling.

Environmental Hazards

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

Lorsban 4E (EPA # 62719-220) – Insecticide

Hazards to Humans and Domestic Animals

May be fatal if swallowed. Harmful if absorbed through skin. Causes moderate eye irritation. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. Avoid contact with skin, eyes or clothing.

Environmental Hazards

This pesticide is toxic to birds and wildlife, and extremely toxic to fish and aquatic organisms. Do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Drift and runoff from treated areas may be hazardous to aquatic organisms in adjacent aquatic sites. Cover or incorporate spills. Do not contaminate water when disposing of equipment washwaters or rinsate. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area. Protective information may be obtained from your Cooperative Agricultural Extension Service.

Poast (EPA # 7969-58-51036) – Herbicide

Hazards to Humans and Domestic Animals

Causes substantial but temporary eye injury. DO NOT get into eyes or on clothing. Harmful if swallowed.

Environmental Hazards

This product is toxic to aquatic organisms. For terrestrial uses, DO NOT apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark. DO NOT contaminate water when disposing of equipment washwaters.

Roundup Original (EPA # 524-445) - Herbicide

Hazards to Humans and Domestic Animals

Keep out of reach of children. Causes substantial but temporary eye injury. Harmful if swallowed or inhaled. Do not get in eyes or on clothing. Avoid breathing vapor or spray mist.

Domestic Animals: This product is considered relatively nontoxic to dogs and other domestic animals; however, ingestion of this product or large amounts of freshly sprayed vegetation may result in temporary gastrointestinal irritation (vomiting, diarrhea, colic, etc.). If such symptoms are observed, provide the animal with plenty of fluids to prevent dehydration. Call a veterinarian if symptoms persist for more than 24 hours.

Environmental Hazards

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

Roundup Ultra Max II (EPA # 524-537) – Herbicide

Hazards to Humans and Domestic Animals

Keep out of reach of children. Causes moderate eye irritation. Harmful if inhaled. Avoid contact with eyes, skin, or clothing. Avoid breathing vapor or spray mist.

Domestic Animals: (Same as for Roundup Original.)

Environmental Hazards

(Same as for Roundup Original)

Sevin XLR PLUS (EPA # 264-333) – Insecticide

Hazards to Humans and Domestic Animals

Harmful if swallowed, absorbed through the skin, inhaled, or if in eyes. Avoid breathing vapors or spray mist. Avoid contact with eyes, skin or clothing. Keep out of reach of children and domestic animals.

Overexposure may cause: Salivation, watery eyes, pinpoint eye pupils, blurred vision, muscle tremors, difficult breathing, excessive sweating, abdominal cramps, nausea, vomiting, diarrhea, weakness, headache. IN SEVERE CASES CONVULSION, UNCONSCIOUSNESS AND RESPIRATORY FAILURE MAY OCCUR. SIGNS AND SYMPTOMS OCCUR RAPIDLY FOLLOWING OVEREXPOSURE TO THIS PRODUCT.

Environmental Hazards

This product is extremely toxic to aquatic and estuarine invertebrates. For terrestrial uses, do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Discharge from rice fields may kill aquatic and estuarine invertebrates. Do not apply when weather conditions favor drift from area treated. Do not contaminate water by cleaning equipment or disposal of wastes. Do not contaminate water when disposing of equipment washwaters.

BEE CAUTION: This product is highly toxic to bees exposed directly to treatment or residues on blooming crops or weeds. However, field studies have shown that Sevin brand XLR PLUS Carbaryl Insecticide is less hazardous to honey bees than other carbaryl products when direct application to bees is avoided and the spray residues have dried. For maximum honey bee hazard reduction, apply from late evening to early morning or when bees are not foraging. Do not apply this product or allow it to drift to blooming crops or weeds if bees are foraging in the treatment area. However, applications may be made during the foraging periods if the beekeeper takes one of the following precautionary measures prior to bee flight activity on the day of treatment: (1) Confine the honey bees to the hive by covering the colony or screening the entrance or: (2) locate hives beyond bee flight range from the treated area. Precautionary measures may be discontinued after spray residues have dried. Contact your Cooperative Agricultural Extension Service or your local Bayer CropScience representative for further information.

Sevin brand 4F (EPA # 264-349) – Insecticide

Hazards to Humans and Domestic Animals

(Same as for Sevin XLR PLUS)

Environmental Hazards

(Same as for Sevin XLR PLUS)

BEE CAUTION: MAY KILL HONEY BEES IN SUBSTANTIAL NUMBERS. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area. Contact your Cooperative Agricultural Extension Service or your local Bayer CropScience representative for further information.

Appendix B

Carlisle Agricultural Land Use Report Form

Please copy and submit a separate form for any additional crop on the same parcel.

FIELD NAME	YEAR: (2006)
FARMER	ACRES FARMED
FARMER ADDRESS	
TELEPHONE	
CROP(S) GROWN (acres or row feet)	
PEST CONTROL (target, control used)	
I.P.M. MANAGEMENT: yes / no ORGANIC MANAGEMENT: yes / no	
Pesticide Applicator License (If pesticide is to be used): yes / no	
Commercial / Private, License Number (If pesticide is to be used):	
SOIL AMENDMENTS (Lime, fertilizer, compost etc. type & quantity)	
YIELD/ACRE	
Was yield greater than _____, equal to _____ or less than _____ you expected?	
To what do you attribute this? (weather, pests, crop grown, soil quality/amendment, etc)	
COVER CROP (If applicable)	

Attach additional pages as needed

APPENDIX C

[illegible]

BOG - MARSH NAME _____